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MCS-224

**MASTER OF COMPUTER
APPLICATIONS
(MCA-NEW)**

Term-End Examination

December, 2024

**MCS-224 : ARTIFICIAL INTELLIGENCE AND
MACHINE LEARNING**

Time : 3 Hours

Maximum Marks : 100

Weightage : 70%

Note : *Question No. 1 is compulsory. Attempt any
three questions from the rest.*

1. (a) Discuss Supervised, Unsupervised and
Reinforcement Learning. 5

- (b) Compare Artificial Intelligence, Machine Learning and Deep Learning. 5
- (c) What is logistic regression ? Briefly discuss the various types of logistic regressions. 5
- (d) Let $P(x)$ and $Q(x)$ represent 'x is a rational number' and 'x is a real number', respectively. Symbolize the following sentences : 5
- (i) Every rational number is a real number.
- (ii) Some real numbers are rational numbers.
- (iii) Not every real number is a rational number.

- (e) For the following fuzzy set : 5

$$A = \left\{ \frac{a}{.5}, \frac{b}{.6}, \frac{c}{.3}, \frac{d}{0}, \frac{e}{.9} \right\}$$

and $B = \left\{ \frac{a}{.4}, \frac{b}{.5}, \frac{c}{.8}, \frac{d}{.2}, \frac{e}{.9} \right\}$

find fuzzy sets :

(i) $A \cup B$

(ii) $A \cap B$

(iii) $(A \cap B)'$

- (f) State the basic steps of machine learning cycle and briefly discuss them. 5

- (g) Discuss ensemble-learning. 5

- (h) Discuss the advantages and disadvantages of dimensionality reduction. 5

2. (a) Explain K-means clustering algorithm with the help of a suitable example. 10

- (b) Explain Single linkage, Complete linkage and Average linkage with a suitable example. 10
3. (a) For the following given transaction data-set, generate association rules using Apriori algorithm. Assume Support = 20%, Confidence = 40% : 10

Transaction-Id	Set of Items
T ₁	A, B, C
T ₂	B, D
T ₃	B, E
T ₄	A, B, D
T ₅	A, E
T ₆	B, E
T ₇	A, E
T ₈	A, B, C, E
T ₉	A, B, E

- (b) Consider the two-dimensional patterns (2, 1), (3, 5), (4, 3), (5, 6), (6, 7), (8, 8), (9, 10) and (7, 8). Using PCA algorithm, calculate the principal component. 10
4. (a) Apply KNN classification algorithm to the following training data to classify class of $X = (10, 7)$. (Assume $K = 3$ and use Euclidean distance measure) : 10

x	y	Class
1	1	A
2	3	A
2	4	A
5	3	A
8	6	B
8	8	B
9	6	B
11	7	B
2	2	A
10	6	B

- (b) With the help of suitable example, prove the following properties of fuzzy sets : 10
- (i) Commutative
 - (ii) Associative
 - (iii) Distributive
 - (iv) De-Morgan's laws
5. (a) Draw a semantic network for the following English statement : 10
- “Mohan greets Nita and Nita's mother greets Mohan.”
- (b) What are the various factors used to be taken into consideration while developing a state space representation ? 10

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